

The Sustainability of an Environmental Policy: A Review of Indonesia Peat Restoration Program

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Abstract. Indonesia's forest fires and peatlands became a global concern in 2015, when 33% of the 2.6 million hectares of land that burned that year occurred on peatlands. One of the current strategies to control the spread of forest fires is to restore 2.4 million hectares of the peatland which had burned in 2015, by 2020. Although it has been more than half of the period of the program, the idea of restoring the peatlands to control the spread of fires have increased by over 60%, compared to the same period last year. Since the implementation of peat restoration policy in Indonesia over three years ago, there is still no example of a successfully restored peat area. However, the peat restoration program includes a minimum three Components of restoration: 1) Ecology, 2) Economy, and 3) Society [1], which often remain unbalanced. This research aims to review the environmental policy program of restoring 2.4 million hectare peatlands which was established at the beginning of 2016. The research will conduct a geographic analysis on the program implementation in Indonesia, also comparing this with sustainable environmental theories and successful restoration projects in the world wide wetlands.

1 Introduction

As Indonesia's peatland become a global concern since it has burned in 2015 and the haze of that fire has been spread across the country, Indonesia has committed to reduce the potential burning area on peatland by restoring the degraded peatland. The President of Indonesia, Joko Widodo, initiated a National Peat Restoration Agency --*Badan Restorasi Gambut* (BRG)-- in 2016 as there are 618,574 hectare peatlands were burned in 2015 [2]. The main objective of the agency is to restore 2.4 million peatland in Indonesia.

Peat ecology sustainability is crucial on maintaining the life cycle of any flora and fauna which related to the biodiversity and sustainability of earth environment. As Indonesia's peat forest in one of the world largest ecosystem on earth, the degradation of peatland affects bigger life cycle.

The restoration program has been developed and implemented in the national level. BRG has released annual report of the national restoration program. In that way, the

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program can be monitored also by people who are not sitting in the governmental institution, although the report sometimes takes a long delivery to be published.

Restoration of peat areas is, in theory including restoring of the natural resources with a consideration of balancing the social and economic aspects [3]. Nevertheless, the ideal proportion of restoration is hard to be determined. BRG Indonesia measures the successful restoration by ensuring the moisture of the peat which drives the program focuses on ecological aspects. However, BRG realizes that their intervention impacts to the human behavior to sustain the quality of peat environment. Therefore, BRG also implements the restoration program into the social and economy facet by strengthening the village capacity.

The peat restoration area is spread in seven provinces; Riau, Central Borneo, South Sumatra, Jambi, South Borneo, West Borneo, and Papua. The reason of selecting provinces is based on the peat criteria that indicates the water quality and peat burned in 2015. This research aims to review the President Decree No. 1/2016 about Badan Restorasi Gambut which stated that BRG has to restore two million hectare peatlands where the progress has been targeted as per 2017, there are 50% peatland has been restored [4].

This paper analyze the advantages and drawbacks of the restoration program based on the President Decree by utilizing geographic analysis to measure the spatial efficiency and employing the sustainability theory to assure the balance of the project implementation. To preserve the updated status of the program, an interview is also held in order to grasp the program perspective from BRG as the program manager. The discussion of the review in this paper will remain impartial as an academic paper.

2 Materials and methods

The research is conducted to review the Indonesia's restoration program which is targeted to be 50% implemented as per 2017. The review is found by evaluating the annual restoration report that has been made by BRG although currently, the 2017 report has been unpublished yet. It will be combined with the geographic analysis and the interview result.

The data that is utilized to support the analysis are global peatland area, degraded peatland area, peat restoration project area, population density in the village project, and settlement area in peatland. All of those geographic data are focused in the seven provinces where has been targeted by the Government of Indonesia. The geographic data will be overlaid to analyze the efficiency of choosing the targeted village and also to monitor the social capacity of its villages.

2.1 Project area overview

As the fire in 2015 burned the peatland which triggered Indonesian government to preserve the peatland from any potential fire, maintaining the moisture quality of the entire peatland in Indonesia is the main objective of the restoration project. The area of the program has been stated on the President Decree that it covers two million hectares of peatland. However, according to the BRG's annual restoration report in 2016, the actual area of Indonesia's peatland that required to be restored is 2.49 million hectares [5]. The area is spread in Sumatra, Borneo, and Papua where BRG has targeted to restore by 2020 [Fig. 1].

The peat classification is defined by the wetness of the peat as the more dry it is, the easier peat is to be burned. It is categorized as: 1) peatland area where has the peat water level below 0.4 meters, 2) peat conservation area where has canals, 3) peat cultivation area where has canals, and 4) the genuine peat area. The last category is excluded from the targeted restoration area by BRG.



Fig. 1. Map of targeted restoration area by Badan Restorasi Gambut, Indonesia.

According to the geographic data of peatland which has been published by The Center of Agroforestry Resource, Ministry of Agriculture --*Balai Besar Sumber Daya Lahan Pertanian* (BBSDLP); Indonesia has 12,932,489 hectare peatlands which has divided as the conservation and cultivation areas. The BRG 2016 report mentioned that there are 875,000 hectare peatlands was burned during fire in 2015 [6], although the National Disaster Management Agency --*Badan Nasional Penanggulangan Bencana* (BNPB)-- stated that it was 618,574 hectares. Nevertheless, all of those burned peatland are on the targeted restoration area and classified as the most prioritized sector. The data that BRG was collected proved depicted that more than 50% of the restoration objective area is in the concession area of the private company [7]. It is only one million hectares remain as non-concession that be the BRG main focus area for restoration project.

2.2 Data and analysis (finding from the annual report)

As it is targeted on the Presidential Decree, BRG plan to achieve the standard [see Fig. 2]. However, in the first stage of the year 2016, BRG had already failed to accomplish the 600,000 hectares restored peatland [8]. By the end of 2016, BRG claimed that they only successfully restored 43% of the 2016 target [9]. The new establishment of BRG in 2016 as a new national agency urged them to cope with the organizational management challenge in the beginning of the project while the implementation has to be started already.

BRG has determined their six goal of restoration program for Indonesia. There are including mapping the peat, creating zonation for peatland based on its functionality, increasing the wetness of the peat, reconstructing the burned peatland, supervising peat restoration construction, and educating local communities [10]. Reflecting from those objective, BRG has assigned the biggest proportion of restoration in ecological aspects.

As it confirmed during the interview with BRG, they have emphasized the restoration on the hydrology and ecology of the peatland. This has been proved that on the first point that they assessed is mapping the hydrology of peatland. It was triggered by the high potential of peat burning since it will be easily and quickly spread out. BRG first project was to map the burned peatland so that they can start rewetting the damaged peat to avoid further potential of peat fire.

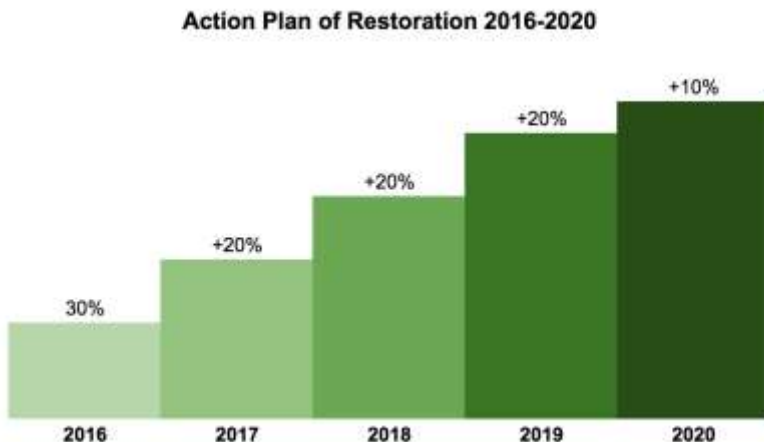


Fig. 2. Illustration chart of action plan progress of Badan Restorasi Gambut, Indonesia.

It is stated in both the annual report and interview that BRG has limited action to undergo restoration project because of the land ownership issue. 1.4 million hectares from those 2.4 million hectares of targeted peatland for restoration program is owned by the private companies. Therefore, the national government only can intervene one million hectares remaining which is far away from the target of restoration. Following to that issue, BRG engage with those private companies to involve in restoration program. Moreover, BRG also expands the strategy to include the NGOs to help them in order to plan, inventorize, and educate people, also to engage the locals to monitor the program together.

The initiative of restoring the peat in Indonesia in order to prevent the potential of peat burning in the next year based on the major fire event in 2015 seems to show its progress. The statistic depicts that in 2015 the peat burned 33.82% of Indonesia peatland while in 2016 there are 32.31% peat were burned [Fig. 3], although the fire in 2015 also was triggered by the El Nino that occurred during that time period where in 2016 the drought season was not as worse as in 2015.

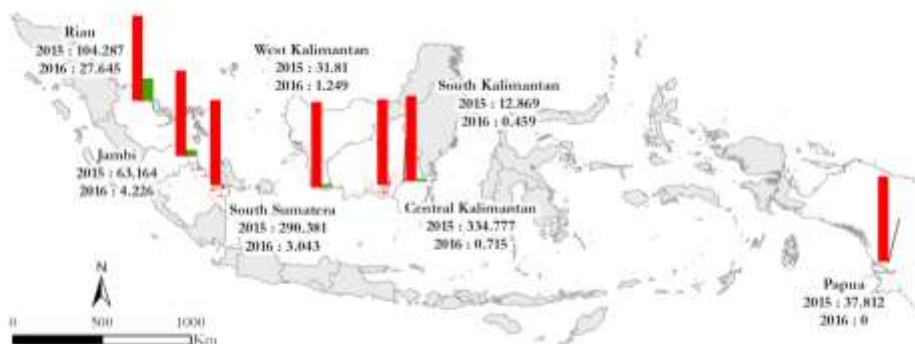


Fig. 3. Map of forest burned footprint on peatland in 2015 and non-burned in 2016 (in hectares).

The increasing of the total population of Indonesia contributes to the extending needs of land to support their life [11]. This creates another challenge to BRG for restoring the peatland. If the life support is increasing, the needs of clearing and utilizing the land including peat in the seven targeted provinces will also grows.

3 Discussion

Discussion on this chapter is divided in three as it measured accurately in the BRG report, there are: 1) location, 2) target, and 3) ecology. Community participatory and technology intervention indicators are excluded since the report that have been reviewed was created to describe the program detail in 2016. In these period, those indicators were not considered to be implemented yet.

3.1 Location based

BRG has prioritized to map the peat activities in the beginning of the restoration program as it is crucial for planning the project. However, the map has limitation in the topology check and metadata that has added the challenge to analyze the geographic data for research and monitoring of the program. The location data also need to be consistent as it was shown that in the same file, there were multiple data which has different measurements.

3.2 Target based

The target of restoration as BRG has plotted illustrates how optimistic the Government of Indonesia in order to restore the peatland to reduce the potential of peat burning. Nevertheless, it is hard to follow as BRG is newly born. The target need to be categorized in different sectors. Learning that in the beginning of BRG establishment, the government focused on the organization and designing the program, the 30% target which has assigned in 2016 could be disseminate as planning and mapping of peat. So that it is not 30% restored peatland like what it is right now.

3.3 Ecology based

In terms of peat restoration, the concern of keeping the ecosystem healthy is important. But the attitude of the population towards the natural resources including peatland is the key for successful restoration of peat. The treatment that is coming from the human behavior of exploiting the peatland needs to be monitored and restored. By this mean, the restoration program will cover the restoration of social which will impacts to the economy and local behavior.

Considering that all of these factors are physical aspect to peat restoration, the strategy of designing the restoration program requires to involve the social and economic elements. This will ensure the outcomes of restoration program as the grand design of the program is reaching multi sectors and the target would be wisely placed.

4 Conclusion

The implementation of the peat restoration program is sometimes not considering whether it is in the highly populated area or not. The program needs to balance the proportion of implementation in each sectors; ecology, social, and economy, which is followed by the measured target so it will be more realistic for implementation.

Acknowledgments

This paper is published with the support from Hibah PITTA-Universitas Indonesia 2018 with the contract number: 2581/UN2.R3.1/HKP.05.00/2018.

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